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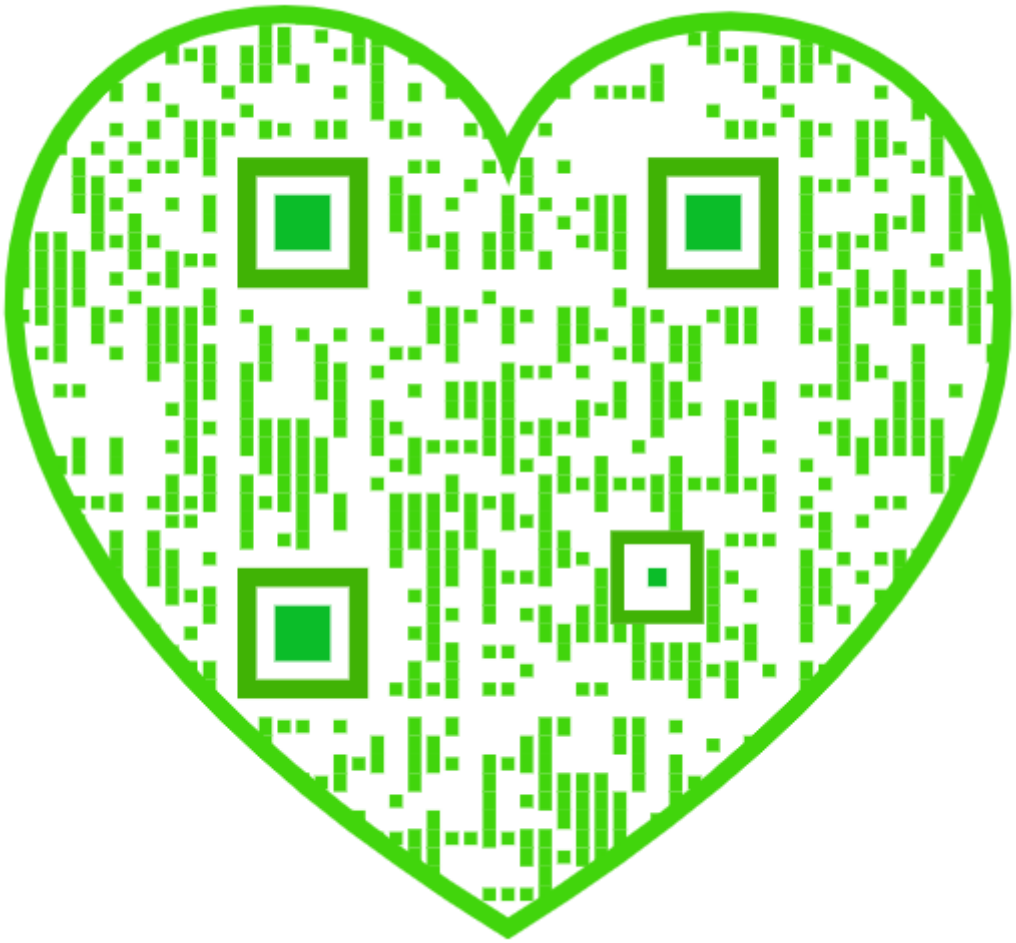

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ATTENTION

Farmers and Dairymen!

READ CAREFULLY

This Treatise on the New Process

FOR MANUFACTURING

BUTTER AND CHEESE.

THE VACUUM PROCESS

PERFECTED BY THE

Powell Manufacturing Co.,

BURLINGTON, VT., U. S. A.

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THE VACUUM PROCESS PERFECTED.

During the past three years, there has been developed by a system of carefully conducted experiments an entirely new method of treating milk, for the manufacture of butter and cheese, which is destined to become of the greatest practical value to the dairy interest generally. The especial feature of this system which distinguishes it entirely from all others, consists in treating milk with heat in vacuum. There were many difficulties in the way and obstacles to be overcome, before the new system could be pronounced perfected, principal among which was the construction of an air-tight receiver of sufficient strength to resist the pressure of the outside air, and at the same time be simple and practical in its workings. Receivers are now built of iron or steel, either tin or porcelain lined, which are perfectly air-tight and in which milk may be set any length of time without absorbing any disagreeable flavor. The method of cooling the heated milk has also been greatly simplified. These receivers, built either singly or in pairs, and having a capacity of 1000 pounds to 2000 pounds each, are surrounded by a wooden jacket with a space of three to five inches between it and cylinder, for cold water and ice used in cooling the milk. They are cylindrical in form, from six to nine feet in length, are furnished with an opening on top to receive the milk, of sufficient size to admit of easy cleansing, and are remarkably convenient and simple to operate.

The method of treating the milk is as follows: The milk on arrival at the creamery in the morning, is conducted first to a

heating tank, where the temperature is raised to 100° or 130° and even as high as 150°, varying with the season of year and condition of the milk. It then passes to the vacuum receiver, cover is put on and closed air-tight. An air-pump connected with the receivers is next set in motion, and continued until the air and vapors arising from the milk are exhausted, and a nearly perfect vacuum formed. Simultaneously with the exhaustion of the air, cold water, or ice, or both, whatever the cooling agent may be, are let into the wooden jacket about the receivers and the temperature quickly lowered to about 45° By this sudden cooling in vacuum, all the cream is raised very quickly, and by the shrinking of the milk all unpleasant odors, animal taints and gases are expelled and worked off by the air pump. The night's milk is treated in the same way, and on the following morning both lots of milk are drawn off together, by means of a faucet in one end of the receiver, into a vat to be made up into cheese. When the cream begins to start, the conductor is changed to the cream vat and the cream is entirely drawn off. When this is accomplished, the receivers are thoroughly cleansed and rinsed (being porcelain-lined this is a very easy operation), when they are ready for use for the day's milk as before. If it be desired to make sweet cream butter, the cream is churned immediately in a sweet condition, and the sweet buttermilk added to the skim-milk already drawn off and made up into a superior article of cheese. If sour cream butter be preferred, it is only necessary to keep over the cream one day to ripen, and the sour buttermilk may be used with the skim-milk as before, by first heating it to a sufficient temperature to destroy the acidity.

To Manufacture Full Cream Cheese by the Vacuum Process.

The milk after being heated to the desired temperature, is conducted to the vacuum receiver, and there treated with vacuum long enough to remove the animal odor, and whatever taints the milk may contain, especially such as produce floating curds, and also to convert a portion of the albumen, which, in ordinary methods of cheese-making, is unaffected by the rennet, into a coagulable form. It is then drawn off into the vats and made into cheese by the common method.

What is Claimed for the Vacuum Process.

First, all milk which has been treated with a combination of heat and vacuum and then cooled, also the cream when separated from the milk, will be found to possess a peculiarly sweet and delicious flavor. This is owing to the fact that the animal odor and other noxious gases have been pumped off, leaving the milk free from gaseous impurities of all kinds, also that it has been entirely protected from those poisonous germs which are always more or less contained in the outside air, thereby leaving it in its purest and most healthful condition. This in itself is a matter of the greatest importance, for in butter making it insures the production of an article of the finest possible quality. The butter has been pronounced by experts to have the finest and most delicate flavor, a firm texture and aud an especially long keeping quality. A microscopic examination shows the butter globules unbroken, thereby giving a solidity of grain and a long keeping quality utterly unattainable by those processes of separating cream by machinery, in which the fatty globules are very much bruised and broken in their rapid passage through the milk, making, when churned, butter soft in texture, inclined to be salvy and to lose its flavor quickly.

But this purifying of the milk is by no means the most important part of the new system. It is well known that after the curd has been separated from the watery portion of milk by rennet, there still remains in the whey, in soluble form, a substance called albumen, which may be coagulated by heat or acids into a soft curd. A large amount of money has been expended in experimenting with a view of saving this valuable solid of milk, but hitherto without success, for although it is not difficult to coagulate the albumen with the caseine and fat, by heating the milk to nearly or quite the boiling point, then cooling and setting with rennet, it has been found that by so high a degree of heat the other solids have been injured, so that it has been impossible to make a fine cheese. The expense of heating a large body of milk to so high a degree of heat, has also been a serious objection. Now it is also well known that liquids boil in vacuum at a very low temperature. Indeed it is not difficult to pump a vacuum of sufficient rarity to cause liquids to boil at a temperature of 100° to 110°. Thus is accomplished in vacuum what would otherwise

be a very difficult matter, viz., the coagulation of the albumen, and that at so low a degree of heat that the remaining solids of milk are entirely uninjured. Other experimenters have observed this property of albumen being coagulated in vacuum at a low heat. Nearly twenty years ago Mr. Gail Borden in some experiments on condensing milk found that the albumen coagulated upon his vacuum pan to such an extent as to prevent evaporation, so that he was obliged to resort to a peculiar device for obviating the difficulty. The advantage of retaining a portion of albumen in the manufacture of skim cheese is two-fold. First, weight of product can be increased from one to two pounds per hundred of milk, which it is at once seen is of vital importance. Secondly, the great obstacle to the successful manufacture of skim cheese is that when cured, it is hard, tough and indigestible. Now this albumen is very softening in its nature and when retained in the curd in proper quantities, the result is a soft, tender and easily digested cheese.

Again, in the manufacture of whole milk cheese, there has always been a large loss of the fatty portion of the milk, owing in part to necessity, and in part to the carelessness of the maker, thereby losing not only in weight of product, but also in quality, since the fat is the richest portion of the milk. Now it has lately been discovered that this coagulated albumen is a remarkable absorbent of fats, so that by this process all the surplus fat that is otherwise lost in the whey vat, is retained in the curd, largely increasing the yield per hundred and also the quality and richness of the cheese.

The company who own the patents covering this process have always been able to sell their product for the highest market prices, and especially in the sales of their skim cheese have been far in advance of the general market. Indeed during the past season when ordinary skim cheese sold for ½ cent to 3 cents per pound, their cheese sold as high as 8 to 10½ cents per pound.

The company would respectfully refer all persons inquiring after the quality of butter and cheese produced by this process to letters and testimonials on file. Also to the following dealers who have sold the goods:

Towle, Hibbard & Co., Boston, Mass.
N. A. Bickford & Co., No. 3 No. Market St., Boston, Mass.
John B. Allen, 69 Governors St., Providence, R. I.

The following is a summary of experiments made during the season of 1884, showing the yield per hundred of milk of butter and cheese.

Date.	Pounds Milk.	Pounds Butter.	Pounds Cheese.	Pounds Butter per hundred Milk.	Pounds Cheese per hundred Milk	Total Product.
June 22,	1058	38 $\frac{10}{16}$	82 $\frac{8}{16}$	3.65	7.79	11.45
" 27,	1297	53 $\frac{4}{16}$	90 $\frac{4}{16}$	4.15	6.95	11.11
July 4,	1404	53	101	3.77	7.19	10.97
" 18,	779	30 $\frac{12}{16}$	51 $\frac{8}{16}$	3.94	6.61	10.55
" 25,	698	29 $\frac{8}{16}$	53	4.226	7.593	11.819
" 28,	812	31 $\frac{9}{16}$	65 $\frac{12}{16}$	3.88	8.09	11.98
" 31,	903	34 $\frac{11}{16}$	63	3.84	6.97	10.81
August 1,	700	30 $\frac{9}{16}$	55	4.366	7.857	12.223
" 2,	702	27 $\frac{14}{16}$	52 $\frac{6}{16}$	3.97	7.46	11.43
" 5,	676	22 $\frac{5}{16}$	52 $\frac{12}{16}$	3.30	7.80	11.10
Sept. 13,	565	26	50 $\frac{3}{16}$	4.60	8.88	13.48
" 14,	590	28 $\frac{2}{16}$	47 $\frac{8}{16}$	4 766	8.05	12.816
" 15,	577	24 $\frac{4}{16}$	54	4.202	9.359	13.561
October 5,	833	34 $\frac{3}{16}$	71	4.10	8.52	12.62
" 9,	774	24	67 $\frac{12}{16}$	3.10	8.74	11.84
" 10,	568	19 $\frac{4}{16}$	53 $\frac{4}{16}$	3.39	9.37	12.76
" 11,	581	20 $\frac{1}{16}$	52 $\frac{2}{16}$	3.45	8.97	12.42
" 12,	500	24 $\frac{6}{16}$	55	4.875	11.	15.875
" 14,	486	16 $\frac{12}{16}$	65	3.446	13.16	16.606
" 15,	619	20 $\frac{2}{16}$	64	3.25	10.33	13.59
" 18,	851	42 $\frac{6}{16}$		4.98		
Nov. 13,	784	31 $\frac{10}{16}$	73 $\frac{8}{16}$	4.033	9.375	13.408
" 15,	109	7 $\frac{1}{16}$		6.479		
" 26,	1168	47	} 252	4.02	} 10.74	
" 27,	1177	45 $\frac{8}{16}$		3.90		
" 28,	1136	44 $\frac{12}{16}$	132	3.93	11.61	15.54
" 29,	664	26 $\frac{4}{16}$	78	3.944		15.690
The four last days.	4145	163 $\frac{8}{16}$	462	3.944	11.146	15.09

Average of 27 tests butter, 4.057 pounds per hundred milk.
Average of 25 tests cheese, 8.996 pounds per hundred milk.
Total product of 25 tests butter and cheese, 12.922 pounds per hundred.

The company are constantly in receipt of the most favorable opinions and testimonials from parties who have visited their works and examined the process in all its details, among which are the following: Mr. Geo. W. Whitney, a practical cheese-maker, in a communication dated October 1, 1883, says: "I was very much surprised at the results obtained, and was present at the Colchester factory and saw made up by the vacuum process

1500 pounds of milk from common cows, on pasture feed, which produced 77 pounds of gilt-edge butter, being a trifle over five pounds per hundred. About nine pounds of good marketable cheese per hundred was also made. I saw enough to give me reason to believe that the heat and vacuum system will take the lead of all others in the market."

William S. Freeman of Richmond, Vt., writes as follows:

Gentlemen—Your cheese at hand, and I can say that they are the best skim cheese I ever saw. I have shown them to many of our best farmers here and they all pronounce it fine and we would like to know the process by which it was made. I can recommend it to any one.

Respectfully,
W. S. FREEMAN.

Mr. S. W. Loggins, an old cheese maker of Williston, in a letter dated September 18, 1883, after a visit to the Colchester factory, where the vacuum system was being worked, states in substance that he saw 2614 pounds of milk manufactured into butter and cheese by that process, producing an unusual amount of the finest granular butter he ever saw, and a large yield of superior skim cheese. This milk gave in total product about 13¼ pounds of butter aud cheese per hundred of milk. The cost of running this system is but a slight advance if any over the old method.

Mr. A. W. Cheever, in the *New England Farmer*, dated December 1, 1883, publishes the following:

"The new vacuum system, as it is called, aims to utilize every ounce of the food material contained iu the milk, and from recent reports received from the company there seems to be much ground for hoping that the highest anticipations will be realized. A sample of skim cheese recently received from the factory was tested by a dealer, who, knowing nothing of its origin or history, pronounced it as fine a quality of cheese as he would need to buy to suit the average taste of his customers, and of ten retail customers who sampled it, seven pronounced it good, two perfect, and one poor, which is getting as many credits as any sample would be likely to, tested by ten customers of average tastes.

Mr. A. W. Cheever, of the *New England Farmer*, reports on the Powell Process, at the State Fair, held in Burlington, Vt., in September, 1883, as follows:

During the week of the Vermont State Fair, it was our pleasure to become by invitation one of a small party to visit a new creamery where butter and cheese are being successfully manufactured from the same milk. The creamery is situated in a beautiful valley in the town of Colchester. The enterprise is a new one.

The milk, as it is brought in by the farmers from the surrounding country, is delivered in an upper story of the factory, which is located

upon a hillside. From the receiving room the milk is run into large iron tanks, some ten feet long by three feet in diameter, placed horizontally, and much resembling the boilers of a stationary steam engine. The tanks are made of strong boiler iron, and have a manhole in one head for inspection, when inspection is necessary. About half way from the bottom are large stationary pipes for conveying water for cooling or heating the milk, and under the bottom and sides are a pair of pipes; within is a water jacket for the same purpose, fitted to revolve and agitate the milk, at the same time it is being heated. An air pump is also attached to the tanks, by which means a vacuum more or less perfect can be secured above the milk while the cream is raising. After the milk enters the tanks, which are filled about half to three-fourths full, hot water or steam is let into the pipes and the temperature rapidly raised to 105 degrees, after which cold water takes the place of steam, and the temperature is reduced down to forty degrees. The heating can be done in ten minutes, but the cooling requires a much longer time, depending somewhat upon the amount of milk in the tanks. When the temperature has been reduced to ninety-five degrees, the vacuum pump is set to work and the air exhausted from the space over the milk.

This operation, it is claimed, removes any dangerous germs, injurious gases, or disagreeable odors the milk may have originally contained, diminishes the amount of that destructive agent—oxygen—while at the same time, it so reduces the atmospheric pressure upon the milk that the separation of the cream is rendered far more complete than by any previous practicable process known to dairymen. At the end of four hours the desired temperature is usually reached, after which the milk is allowed to stand eighteen hours longer, or until the tanks are needed for the next day's supply of milk.

The cream and milk are drawn from the tanks separately through tin pipes, the former into cans, the latter directly into the large cheese vats which are located conveniently at a lower level. The cream is churned while sweet, and the buttermilk all goes into the cheese vats with the skimmed milk. The cheese is then made by the usual factory process, varied somewhat, both in manufacture and curing, according to the nature of the materials, and the demands of the market. The amount of milk received during the summer has ranged from 5,000 to 8,000 pounds daily, according to the supply produced, and about thirty per cent. higher rates have been paid than at some other factories where either butter or cheese alone has been made. The product from one hundred pounds of milk as received from the farmers, who in this section confine their cows almost wholly to pasture feed during the summer season, has reached four and a half pounds of butter, and nine and a quarter pounds of cheese. The sweet cream butter, as we saw and sampled it, would find sale, for immediate consumption, at prices fully equal to the best creamery brands in the country, East or West, and is gradually being appreciated in Boston market, as its merits become known.

In the cheese curing room we saw about 700 on the shelves, weighing a little over fifty pounds each, and as handsome a lot as we have ever seen in the best managed whole milk factory. The earlier make had been sold off, and as there was none on hand at the time quite ripened for market, we could not judge of the quality, as we otherwise might, but the facts that the sales thus far have reached high figures, and that a sample known to be imperfect was exhibited at the State Fair, and received a premium in competition with ten other exhibitions, speak well for the character of the goods.

Mr. Herbert Myrick, of the *N. E. Homestead*, visited the Company's works at West Milton, Vt., in the summer of 1884, and

made a very careful observation of all parts of the process. His report of same was published in the *Homestead* of Sept. 13, 1884, in the course of which he makes the following statements :

The cream seems to have ripened in the vacuum while rising, and the quality of the butter is second to none. It has sold several cents above the market all summer and is in unusual demand. The butter thus made from the milk of inferior common cows on pasture feed has much of that clean, pure, exquisite, nutty flavor characteristic of the finest Jersey product made where the most scrupulous cleanliness is observed.

Cheese is made from the mixed skim and buttermilk in the ordinary way. Milk treated by this system, however, permits more of the so-called albumen to be fixed in the curd than common. This makes the quality far superior to that of ordinary skim cheese. This is apparent to the taste even of a non-expert. The prices received—3 to 8c a pound—also forcibly demonstrate its superiority over the common skim cheese that sells for 1 to 4c. The Powell skims are not hard, leathery or brittle, but crumble much like full cream cheese, proving their digestibility. It is hoped eventually to retain all the albumen in the cheese. The progress already made in this point is great.

Here are the main points in the Powell process : 1. Fully as much and perhaps more butter is obtained from the milk than is obtained by any other system . 2. Almost if not fully as much cheese is taken from the milk left after the butter is extracted as is commonly made from whole milk. The Powell cheese of course is not a whole milk cheese, but a skim cheese of a quality that will outrank much of the full cream cheese in the market. To make the merit of the system still more clear : The total products of solids (butter and cheese) is greater by the Powell process than by any other on record, ranging from 10 to 15 per cent. Ten per cent of total solids (butter and cheese) is considered a low average. One test made July 31—a hot, sultry day—resulted thus : From 700 lbs. of milk were made 30 lbs. 9 oz. of butter and 55 lbs. of cheese. This was 4.365 lbs. of butter and 7.857 lbs. of cheese from each 100 lbs. of milk, or a total product of 12 lbs. 4 oz. from 100 lbs. of milk. The day before we visited the factory, a test was made in which 500 lbs. of milk yielded 3.1 lbs. of butter and 12.06 lbs. of green cheese, or 15.16 lbs. of total solids from each 100 lbs. of milk—an unprecedented record. Eleven pounds of product (butter and cheese) is the highest amount on record obtained by any other method from the common milk of native cows on pasture without grain. The Powell folks also claim an average quality and market return for their total product exceeding that by any other method. It is hardly probable that 15 per cent of solids (butter and cheese) can be obtained in practice. But an average product of 12 to 13 lbs does seem practical. This is one to three pounds more than is obtained by any other system. This gain and the improved quality of the whole product, especially the cheese, is where the Powell process appears to excel other methods of manufacture. If the whole product will sell for an average of 1c a pound more than the butter and cheese commonly made, and to this increase is added the amount received for the one to three extra pounds of product, it will be seen that the saving and income received from milk manufactured by this process will be a very handsome sum.

In a communication, entitled "A Day's Vacation," published in the *N. E. Farmer* of January 10, 1885, the Hon. F. D. Douglas, Chairman of the Committee of Agriculture, Legislature of

Vermont, describes a day's visit to the West Milton Creamery, in company with the Hon. A. A. Storrs of Randolph, as follows:

With the prospect of a short legislative vacation, myself and friend planned a visit to the Powell creamery, located at Milton, Vermont. We left Montpelier by an early train, that we might witness as much as we could of the entire process of manufacture, from the delivery of the milk, to the completion of the work; that we might examine critically, the various details of manufacture, and test the results of the application of that system by a careful inspection of the butter, cheese, milk and sugar, which were being daily produced by its use. On our arrival at the factory, we found that the morning's milk had all been delivered, and the heating process had commenced. When a temperature of nearly 130° had been reached, the air pump was set in motion, the vapor and air exhausted, and the cooling process commenced. The temperature of the milk was carried down as rapidly as possible, by the use of ice water, in which the tanks containing it were enveloped, and the vacuum made still more perfect by the condensation of the small amount of vapor remaining above the mass, and which the dairy pump had failed to remove. In this manner the cream was raised very rapidly, all animal odors and injurious gases removed, and the milk and cream excluded from all atmospheric influences, until the desired separation was completed, and the stock prepared for the next steps in the process of conversion into butter and cheese.

If sweet cream butter is desired, the churning is commenced at once, otherwise the cream is allowed to become slightly acid. A revolving box churn is used, and we saw taken from it some of the finest sweet cream butter that we had ever tasted. The flavor, granulation and color were perfect, and for obvious reasons it must possess better keeping qualities than sweet cream butter made by any other process. We witnessed also, the conversion of the skimmed milk, or rather drawn milk, (as the old laborious process of skimming is avoided) and buttermilk, into cheese. This did not differ materially from the ordinary factory process. There was, however, this advantage: the milk was unusually sweet and pure, the heating and vacuum process having completely removed all unpleasant tastes and flavors. The flavor of the curd was also delicious, and the cheese superior in quality, as we have reason to believe from a critical examination of the samples which we found upon the shelves of the chamber above.

The next novel and interesting process we witnessed, was the extraction of the sugar from the whey. The result was the production of a nearly pure white sugar, several barrels of which was shown us, and sampled. It is not as sweet as ordinary cane sugar, but has a pleasant flavor, and is used for medicinal purposes, and has a ready sale.

With regard to the residue of the milk, after being submitted to the various processes which I have described, I am not prepared to speak with certainty, as vapor is too volatile for critical inspection by any means in our possession. I am quite sure that all the solids were extracted and utilized. I have reason to believe that the part removed from the milk by the heat and air-pump was more or less impure, and carried with it injurious gases, animal and other odors, which, if retained, must necessarily affect both the flavor and keeping qualities of the product. One result of the Powell process, as we witnessed it, is very evident, and that is, the fact that all of the valuable elements of the milk are utilized, and that there is no waste.

After many very pleasant experiences, we returned, well pleased with our trip, and with new subjects for thought while conducting our own dairy matters. The conclusion which I think may be safely drawn from

our personal observations, with regard to the advantages of the Powell system, may be summed up as follows, viz:—

1st. The heating and vacuum process gives superior purity to the stock used for both butter and cheese.

2d. It causes a rapid, and if desired, complete separation of the cream from the milk.

3d. It imparts better keeping qualities to its sweet cream butter than any other process.

4th. By it the buttermilk can be converted into cheese without loss of quality.

5th. The heating and vacuum process imparts a soft, rich character and appearance to its skim cheese, by its peculiar effect upon the albumen and other elements of the milk.

6th. It produces more pounds of manufactured product in proportion to milk used, than by any other process.

7th. It may be made as convenient and practical in its various details, as any other system.

If we are right in these conclusions, it should receive the careful consideration of all interested in the associated system of dairying.

F. D. DOUGLAS.

Mr. Storrs corroborates the above statement as follows:

RANDOLPH, Jan. 26th, 1885.

MR. PECK—Dear Sir:

I read Mr. Douglas' piece in regard to our visit. I would say I think Mr. Douglas has given a very correct description of what we saw at your factory. We were both highly pleased with the quality of both butter and cheese. I especially was much pleased with the amount of product obtained from 100 lbs. milk, and hope that it will eventually revolutionize the method of making our dairy products.

Sincerely yours,

A. A. STORRS.

The Hon. Hiram A. Cutting, Secretary of the Board of Agriculture, State of Vermont, gives the following opinion of the vacuum process, after a careful inspection of the works at West Milton, on Nov. 27, 1884:

BUTTER MAKING—THE POWELL PROCESS IMPROVED.

It is but a few months since this new way of using milk has attracted attention. There were then difficulties to surmount and objections to overcome, that rendered the result at least of uncertain utility, but to-day this process has become so practical in all its details, that it stands unrivalled as a Butter-Making Process, to say nothing of the Cheese and Sugar Making.

Hearing so much in favor of it, I embraced an opportunity offered to inspect the entire process, and can say that I am not only favorably impressed, but feel certain that it is to largely revolutionize the factory methods of butter-making.

The process is a combination of two previous methods tried long ago. These were the rapid heating of the milk in the open air, to drive off all

odors, and the raising of the cream while cooling. This was found defective, on account of the bursting of the cre am.

The vacuum process, so-called, by which cream was raised in the churn was also defective, as the raising of the cream was not enough facilitated to pay the expense, but this combination all works for the greatest advantage of the products.

The detail of the process is as follows: The milk upon its reception is first heated by steam, in an open pan, to the temperature of from 100° to 130°, according to the weather and time of year, the highest temperature being required in Summer. It is then drawn by a faucet into a cylinder, thus being fully areated. The cylinder is surrounded with cold spring or iced water which cools the milk speedily to 45°. During this time the cylinder is closed, the air pumped out to nearly or quite a perfect vacuum. This entire heating and cooling process occupies about three hours; after this it is drawn from the cylinder into the cheese vats, and the curd set for cheese. The cream is drawn into the churn and churned into sweet cream butter, or the cream may be soured if preferred. Previous to this invention, it was difficult to get all the butter-milk out of sweet cream butter, and hence it did not keep well; and while many desired it, it was not a popular product to manufacturers. By this process the cream separates more perfectly and the ripening is such that under the microscope the butter shows the same perfect globules, free from any attendant substances, as in the gilt edge sour cream butter, and I believe from such examinations, that the butter will keep as well as any butter can. I learn that these observations are borne out by actual fact. Then the cheese for a skim milk cheese is indeed very superior. I have subjected the cheese to various tests and find it not only soft and palatable, but to have more albumen than other skim milk cheese, and hence more valuable as a food, as well as more digestible.

This fine cheese makes this process much superior to the centrifugal sweet cream process, as while they get good cream, by the admission of those interested the cheese is of a very inferior quality. In the *New England Farmer* of Dec. 6th, it is said in reference to a factory run by Mr. Norton, using the DeLavel Cream Separator, "The quality of both butter and skim milk is inferior to the products of the cold setting at Farmington." "The skimmed milk is particularly noticeable for its thinness and the butter brings several cents per pound less than at the Farmington Creamery." Of the Powell process the reverse is apparently true. As regards Engine Power, or expenditure for ice, both are less in the Powell process, hence it is much the cheapest. In results the one gives in a little hand-bill thrown out by those interested in the DeLavel Cream Separator, a rate of yield of 1 pound of butter to 23 $\frac{3}{10}$ lbs. milk or a little less than 4 $\frac{1}{2}$ lbs. to 100 lbs. of milk. Tests by the Powell method have given 6 $\frac{1}{2}$ lbs. butter to the 100 lbs. milk, and have on ordinary milk of native cows given 4 $\frac{8}{10}$ lbs. butter to the 100 lbs. and 11 lbs. of a good quality of cheese from the same milk, that sold for 8 cts to 10 $\frac{1}{2}$ cts. per lb. in market, and no oleomargerine in it, as our laws prohibit the use of that material altogether. I have no doubt but that this process of butter and cheese making will meet with much favor.

1. It can be advantageously used in the warmest as well as coldest weather.

2. It requires less expenditure of Ice than most methods of setting as the whole cream-raising process is done while the milk is cooling.

3. The butter is of the best quality and the cheese desirable.

4. The work is much less, hence the cost is in every way decreased.

This Company evaporates the whey into sugar, by a new process covered by patents, and yet a great saving to the Company is the result. Whether they will sell this right, I am unable to state, but the right to manufacture butter and cheese by their process and the machinery necessary for the purpose, can be purchased at reasonable figures. I believe it worth

while for those interested in factories, to examine fully this method, as if it is all it promises it is the desirable means whereby the best results may be accomplished.

(Signed,) HIRAM A. CUTTING,
Secretary Board of Agriculture.

For further particulars or inquiries, address

THE POWELL COMPANY,
Burlington, Vermont.